

Effect of Genotype and Seed Size on Yield and Seedling Quality Parameters of Groundnut (*Arachis hypogaea* L.)

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ABSTRACT

A field experiment was conducted to assess the influence of genotypes and seed sizes on yield and seedling quality parameters of groundnut by using two genotypes and four different seed sizes *viz.*, large, medium, small and assorted. The study revealed that the genotypes differ significantly for all the yield component traits. The genotype, Dharani was found to be good for the traits studied such as plant height, number of branches per plant, number of pods per plant and kernel yield per plant. Among the different seed sizes studied, large seed exhibited superiority for plant height, number of branches per plant and kernel yield per plant in Dharani variety. The interaction effects between genotypes and seed sizes were found to be non-significant for kernel yield per plant. The germination percentage was found to be non-significant for genotypes and seed sizes studied. Large seed of Kadiri-6 variety exhibited significant differences over other seed sizes for root length while there was no significant difference among the genotypes for shoot length and fresh weight. Dry weight was found to be high in Dharani over Kadiri-6 variety. From the study, it can be concluded that larger seeds produce vigorous seedlings than smaller seeds.

Keywords: *Groundnut, seed sizes, seedling quality parameters, yield parameters.*

Groundnut is one of the most important oilseed crops of India. It contains 48-50% of oil and 26-28% of protein, and is a rich source of dietary fiber, minerals and vitamins. For a successful crop production, the use of good quality seed is very essential which increase the yield by 15-20% (Ambika *et al.*, 2014). The extent of this increase is directly proportional to the quality of seed that is being sown. The seed size and its heterogeneity is a major factor in non-uniform growth of seedlings in the field (Bonan, 1991). There are many factors responsible for low yield which includes low quality seed, poor seed germination, poor seedling vigour and poor varietal performance based on different agro-ecological zones. Among these germination and seedling vigour are greatly influenced by seed sizes. In groundnut, seed cost constitutes nearly 30% of total cost of production. In view of the above the present study was undertaken to assess the effect of genotype and seed size on yield and seedling quality parameters of groundnut.

MATERIAL AND METHODS

A field trial was conducted at Seed Research and Technology Centre, Rajendranagar, Hyderabad during *rabi* 2013-14 and laid out in randomized block design with three replications. The experimental material consists of two groundnut genotypes *viz.*, Kadiri-6 and Dharani with four different seed sizes *viz.*, large, medium, small and assorted. Seed was categorized based on test weight (g) which differed with varieties as follows:

Variety	Large	Medium	Small	Assorted
Kadiri-6	41	36	33	35
Dharani	47	39	35	40

The crop was sown with a spacing of 30 x 10 cm and recommended package of practices were followed to raise a healthy crop. The data was collected for the quantitative traits such as plant height (cm), number of branches per plant, number of pods per plant and kernel yield per plant (g). Seedling quality parameters were recorded for germination (%), root length (cm), shoot length (cm), seedling fresh weight (g) and dry weight (g). The mean data was subjected to two factor statistical analysis by using OPSTAT software.

RESULTS AND DISCUSSION

Influence of genotypes and seed sizes on yield contributing traits of groundnut was presented in Table-1. Results indicated that genotypes differ significantly for all the yield component traits. The genotype Dharani was found to be good for all the quantitative characters studied such as plant height, number of branches per plant, number of pods per plant and kernel yield per plant. Among the different seed sizes studied, large seed exhibited significant differences for plant height followed by medium sized seed in Dharani variety. More number of branches per plant (9.03) was also observed in large seed of Dharani. The kernel yield per plant was found to be high in large size seed and

Table 1. Influence of genotypes and seed size on yield and its components of groundnut

Treatment	Plant height (cm)		No. of branches per		No. of pods per		Kernel yield per	
Kadiri-6								
Large	39.67		8.50		43.5		20.87	
Medium	35.5		7.47		37.8		17.70	
Small	31.17		5.37		34.3		16.55	
Assorted	35.83		6.10		41.5		19.90	
Dharani								
Large	41.50		9.03		52.3		23.00	
Medium	42.63		7.60		45.4		19.81	
Small	39.19		6.33		40.7		17.44	
Assorted	43.92		8.63		47.6		21.02	
	CD	SE(m)	CD	SE(m)	CD	SE(m)	CD	SE(m)
F(A)	1.61	0.53	0.33	0.1	2.96	0.97	1.37	0.45
F(B)	2.28	0.75	0.46	0.15	4.19	1.38	1.94	0.64
F(Ax B)	3.23	1.06	0.66	0.22	NS	1.95	NS	0.91

Table 2. Influence of genotypes and seed size on seedling quality parameters of groundnut

Treatments	Germination (%)		Seedling Root length (cm)		Seedling Shoot length (cm)		Seedling Fresh weight (g)		Seedling Dry weight (g)	
Kadiri-6										
Large	93.5		15.5		7.3		2.76		0.42	
Medium	92.3		12.5		6.0		2.33		0.29	
Small	94.0		11.7		4.6		1.78		0.23	
Assorted	91.0		13.2		6.4		2.11		0.31	
Dharani										
Large	95.3		13.3		8.1		2.55		0.53	
Medium	96.0		11.9		6.6		2.24		0.33	
Small	93.7		11.6		4.9		2.00		0.28	
Assorted	92.0		13.1		6.4		2.40		0.39	
	CD	SE(m)	CD	SE(m)	CD	SE(m)	CD	SE(m)	CD	SE(m)
F(A)	NS	0.97	0.43	0.14	NS	0.3	NS	0.05	0.01	0.01
F(B)	NS	1.37	0.6	0.19	1.28	0.42	0.23	0.07	0.02	0.01
F(AxB)	NS	1.94	0.85	0.28	1.82	0.6	NS	0.11	NS	0.01

assorted seed followed by medium size seed. Ramadevi and Ramarao (2005) reported that the bold seeds recorded higher plant height, number of branches, number of pods/plant, pod yield and harvest index in groundnut varieties while, Detroja *et al.* (1993) reported that differences in seed size did not influence plant height, number of branches per plant, number of pods or shelling percentage. The interaction effects between genotypes and seed sizes were found to be non-significant.

Effect of genotypes and seed sizes on seed quality parameters of groundnut were presented in Table-2. Among the different traits evaluated, germination percentage was found to be non-significant for genotypes and seed sizes studied. Large seed of Kadiri-6 variety exhibited significant differences over other seed sizes for root length. Sibuga and Nsenga (2006) observed that significant effects of cultivar and seed size on shoot and root biomass. Soltani *et al.* (2001) reported that seedlings grown from larger seeds have better establishment in the farm compared to the smaller seeds and it produces larger seedlings. The larger seeds due to having more food, produce more powerful seedlings before complete establishment of the plant (Mugnisjah and Nakamura, 1986). There was no significant difference among the genotypes for shoot length and fresh weight. Assorted seed of Dharani variety was found to have greater seedling fresh weight than other seed sizes. Dry weight was found to be high in Dharani over Kadiri-6 variety. Interaction effect for fresh weight and dry weight was found to be non-significant.

The study reveals that higher shoot length, root length, fresh weight, dry weight in large sized seed due to accumulation of more food material which results in vigorous seedlings. Knauff *et al.* (1990) reported that high germination rates, vigorous growth and high yield in larger seeds of groundnut. The early vigour and dry matter production in plants from variety with large seed might have increased early plant vigour and growth leading to higher photosynthetic efficiency coupled with higher translocation efficiency resulting in increased number of filled pods and consequently decreasing the unfilled pods. Similar results have been observed by Ramadevi and Ramarao (2005).

CONCLUSION

From the study it can be concluded that, the genotype Dharani was found to be good for yield and its components and in case of different seed sizes studied, large seeds produce vigorous seedlings than smaller seeds.

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